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XIC - D06C-011/00 ; D06M-015/00 ; D06M-023/00
AB - J04202853 Prepn. comprises effecting water repellent treatment to a fabric, removing the water repellent on at least one side of the fabric, and coating processing.
- The fabric is pref. a sheet state material of synthetic fibre e.g. polyester, aliphatic or aromatic polyamide, PAN, PVA, PVC, or their modified fibres, natural fibre e.g. wool, silk, cotton or hemp; or semi-synthetic fibre e.g. acetate or rayon; and includes woven fabric, knit fabric, nonwoven fabric, etc.. The water repellent is silicone based, paraffin, aliphatic amide or alkyl ethylene urea, esp. F based water repellent to obtain high water repellency. Removal of the water repellent may be effected by elution with solvent or abrasion with card, clothing or sand paper. the resin is polyurethane based, polyacrylic, PVC based or PVAc based resin.
- USE/ADVANTAGE - Useful for clothing, tent fabric or tarpaulin. The fabric has good water repellency and adhesive propertn(Dwg.0/0)
IW - PREPARATION COATING FABRIC CLOTHING TENT FABRIC TARPAULIN COMPRISE WATER REPEL TREAT FABRIC REMOVE REPEL SURFACE COATING PROCESS
IKW - PREPARATION COATING FABRIC CLOTHING TENT FABRIC TARPAULIN COMPRISE WATER REPEL TREAT FABRIC REMOVE REPEL SURFACE COATING PROCESS
NC - 001
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PAW - (TORA) TORAY IND INC
TI - Prepn. of coated fabric for clothing, tent fabric and tarpaulin - comprises water repellent treating fabric, removing repellent from surface and coating processing

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(54) Title of the Invention: Method of Manufacturing Coated Cloth

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SPECIFICATION

1. Title of the Invention

Method of Manufacturing Coated Cloth

2. Claims

1. A method of manufacturing coated cloth characterized in that, after the cloth has been subjected to water repellency treatment, the water repellent present at[1] the surface layer portion of one side or both sides thereof is removed, after which coating processing is carried out.

2. A method of manufacturing coated cloth according to Claim 1 in which the water repellent removal treatment is sandblast processing.

3. Detailed Description of the Invention

Field of Industrial Application

The present invention relates to a method of manufacturing coated cloth with excellent water repellency and excellent coating film adhesiveness.

Prior Art

For coated cloth, for example cloth for clothing that is coated on one side, it has hitherto been general practice for the cloth to be water repellency-treated with a fluorine-type or silicon-type water repellent in order to prevent penetration of the coating resin, the coating process being carried out thereafter. In addition, in the case of cloth coated on both sides for industrial use, such as tent material and tarpaulin, in order to prevent permeation of water into the interior of the cut end face by capillary action it is general practice to perform a coating process after the cloth has been water repellency-treated with a fluorine-type or silico[*sic*]-type water repellent.

However, this pre-treatment with these water repellents has been undesirable from the viewpoint of the coating film's adhesiveness: generally, the more the water repellency improved, the more the adhesiveness of the base fabric and coating film was reduced. Therefore, the present situation is that if a pre-treatment imparting strong water repellency is carried out in order to give higher water repellency performance to the non-coated face of cloth with one face coated for [use as] sportswear, for example, the

[1] The Japanese word translated as "at" has a very wide range of meaning which can include "in" and "on"

adhesive force of the base fabric and coating film is further reduced, and a coated cloth which will stand up to practical use cannot be obtained.

In order to solve these problems, first cloth which has initially undergone a relatively weak water repellency pre-treatment which satisfies adhesiveness [requirements] is subjected to a coating process, and then in addition the non-coated face undergoes a high-level water repellency process, but the processability of coating the pre-treated water-repellent face with further water repellent is extremely poor, and ultimately a coated cloth which satisfies at the same time [the two requirements of] high water repellency and high adhesiveness is not obtained.

A method has also been proposed, in Japanese Patent Laid-Open Publication (1984) 59-106570, in which adhesiveness is improved by exposing one face only to a low-temperature plasma after the cloth has been water repellency-treated. However, with this method there have been the problems in that special vacuum apparatus and discharge apparatus are required, necessitating a large capital investment, so that a substantial increase in cost is unavoidable, and also, depending on the treatment conditions, the plasma reaches the portion in which a water repellency function is supposed to be maintained, so that process stability has been inadequate.

Problems to be Solved by the Invention

The aim of the present invention is to offer a method of manufacturing coated cloth which satisfies at the same time [the need for] high water repellency and high adhesiveness.

Means for Solving the Problems

In order to achieve this aim the present invention has the following construction.

The method of manufacturing coated cloth of the present invention is characterized in that, after the cloth has been water repellency-treated, the water repellent present at the

surface layer portion of one face or both faces of the cloth is removed, after which coating processing is carried out.

Operation

The present invention is one in which, as a result of thorough study in relation to the fact that the adhesiveness to resin is remarkably reduced if resin processing is performed where water repellency has been imparted to cloth by a water repellency treatment, it was discovered that, by actively eliminating the water repellent present on the extreme outer surface portion of the cloth, the adhesiveness can be improved without lowering the water repellency. That is to say, a characterizing feature of the present invention is that the water repellency of the cloth's surface layer only is eliminated while the water repellency of the cloth's inner layer is left unaltered.

"Cloth" in the present invention means a sheet item, for example woven fabric, knitted fabric, nonwoven fabric or similar, made up of synthetic fibres such as polyester, aliphatic or aromatic polyamide, polyacrylonitrile, polyvinyl alcohol or polyvinyl chloride, or improved [versions] thereof, natural fibres such as wool, silk, cotton or flax [*or* "hemp"/"jute"], or semi-synthetic fibres such as acetate or rayon, or mixtures thereof.

The first characterizing feature of the present invention is that [one of] these types of cloth is subjected to water repellency treatment, and with the present invention a high degree of water repellency can be imparted to the finished product.

A normal method of water repellency treatment can be used as the water repellency treatment, that is to say, a fluorine-type, silicone-type, paraffin, aliphatic amide, alkylethyleneurea, or similar [water-repellent] can be used, but preferably a fluorine-type water repellent is used because a high level of water repellency is obtained.

Cloth is coated, by a method such as a padding method, immersion method or spray method, with [one of] these water repellents in an emulsion state in which it has been

dispersed by an organic solvent or an emulsifying agent, and is dried at 100-130°C, and subjected to heat treatment at 160-180°C as required.

As for water-repellency treatment methods other than the above, a method may be employed in which the cloth is subjected to low-temperature plasma treatment in a fluorine gas atmosphere or a fluorine-containing-compound gas atmosphere.

The second characterizing feature of the present invention is that the water repellent present at the surface layer portion of one side or both sides of the water repellency-treated cloth is removed.

Removal methods such as elution with a solvent or abrasion brought about by means of card cloth [*or* "wire fillet"; literal translation - "needle cloth"], sandpaper or similar can be used, but sandblast processing is particularly preferred.

This sandblast processing is a process which causes "fine-powder particle-bodies" to hit the surface of the material at high speed, and alters the properties or shape of that surface. By this process it is possible to eliminate the water repellency of the cloth's extreme outer surface layer only.

Manmade and natural mineral particles[2] can be used as the "fine-powder particle-bodies", and of these, "acute polygon" hard particles are preferred. In addition, ones with a relatively high specific gravity are better, for example inorganic powders such as alundum, carborundum, quartz sand or silica, or iron, nickel or aluminium, and in particular metal powder and similar are used as preferred "fine-powder particle-bodies". With regard to the "fine-powder particle-body" particle size, preferably one of 20-350 mesh is used, but the most suitable particle size varies according to the type of fibre starting material of the cloth to be treated and the treatment conditions.

[2] The Japanese word translated as "particle" throughout this document can also be translated as "grain"

These "fine-powder particle-bodies" are caused to hit the cloth by causing them to fly at high speed using a spray device employing compressed air or a projection[?] treatment device in which centrifugal force is used.

If a spray device is used a spray nozzle diameter of 2-10mm, a compressed air pressure of 1-10kg/cm^2, a spray distance of 5-30cm, and a spray time of 10-1000 seconds/m^2 are preferably selected, but [the invention] is not necessarily restricted to these, and it is desirable that the most suitable conditions be selected as desired according to the type and particle size of the "fine-powder particle-bodies" and the type of cloth to be treated.

This sandblast processing is carried out on one face or both faces of the cloth, according to the objectives. That is to say, three different kinds of performance can be imparted, imparting different kinds of performance to the front and back faces of the cloth respectively, and in addition imparting another [kind of] performance to the cloth's internal layer.

The third characterizing feature of the present invention is that the cloth face on which this sandblast processing has been carried out is subjected to a coating process.

As the coating process of the present invention, generally employed dry coating methods or wet coating methods using such coating methods as a knife coating method, roll-coater method, dip-nip[?] method, immersion method, etc or a lamination method can be used.

The resin for use in this coating process should be a resin normally used for coating processing. For example, polyurethane-type resin, polyacryl[ic?]-type resin, polyvinyl chloride-type resin, polyvinyl acetate-type resin, or similar can be used.

By adopting the construction of the present invention, it has been possible for the first time to manufacture a coated cloth which satisfies at the same time [the two requirements] of high water repellency and high adhesiveness.

Embodiments

More detailed explanation will now be given with reference to embodiments.

The physical property values shown for the embodiments and comparative examples were measured by the following methods.

(a) peeling : measured in accordance with JIS K-1977, using a strip specimen 2.5cm wide

(b) water repellency: measured by the test method (spray method) laid down in JIS L-1079

(c) water absorption-height: the water absorption speed measurement method B (Byrek [? a non-Japanese name, the spelling of which is unknown] method) laid down in JIS L-1096 was followed, the water absorption height being measured after 24 hours

(d) penetration of the coating resin: assessed by microscopic observation of the woven-fabric face

Embodiment 1, Comparative Examples 1-3

Plain weave cloth, for the warp and weft of which 70 denier 24 filament nylon 6 yarn were used (warp density 122 [yarns]/in, weft density 89 [yarns]/in), was scoured, dyed and dried by normal methods. Next this woven cloth was immersed in a 40g/l aqueous solution of "NK Gaado[?"Guard"] 270" (fluorine-type emulsion water repellency-processing agent, manufactured by Nikka Kagaku Co.), and wrung with a mangle, after which it was dried at 120°C and heat-treated at 170°C.

Thereafter one face of this water repellency-processed cloth was subjected to sandblast processing by a spray method under the following conditions: spray nozzle diameter of 5mm, compressed air pressure of 2.5kg/cm^2, a spray distance of 25cm, and a spray time of 45 seconds/m^2, using 120-mesh white alundum particles. Next, the sandblast-processed face of the cloth was coated with a knife coater using a dimethylformamide solution of "Kurisubon" 8006HV (polyester-type polyurethane resin, manufactured by Dai-Nippon Ink Co), after which it was immersed in water and "wet-coagulated" (Embodiment 1). The thickness of this coating film was 32 microns.

As comparative examples, coating was carried out in the same manner as in Embodiment 1 on the same dyed cloth as in Embodiment 1 and neither water repellency-processing nor sandblast-processing was carried out (Comparative Example 1); [the cloth] was subjected only to water repellency-processing in the same manner as Embodiment 1 (Comparative Example 2); and [the cloth] was immersed in a 30g/l aqueous solution of "Dikku Gaado [?"Dick Guard"] F-70" (fluorine-type emulsion water repellency-processing agent, manufactured by Dai-Nippon Ink Co.) as a weak water repellency-processing, and wrung with a mangle, after which it was dried at 120°C and heat-treated at 150°C (Comparative Example 3).

The coating film peeling strength, the woven-fabric face's water repellency, and the penetration of the coating resin of the coated cloth obtained are shown in Table 1.

Table 1

	water repellency processing	sandblast processing	peeling strength (g/cm)	water repellency (points)	coating resin penetration
Embodiment 1	yes	yes	830	100	no
Compar. Ex. 1	no	no	710	0	yes
Compar. Ex. 2	yes	no	360	100	no
Compar. Ex. 3	yes	no	450	100	no

As can be seen from Table 1, the item according to the present invention had no coating resin penetration and a high peeling strength and high water repellency.

Embodiment 2, Comparative Examples 4-6

Twill fabric for whose warp 75 denier 24 filament polyethylene terephthalate yarn was used and for whose weft 75 denier 36 filament polyethylene terephthalate yarn was used (warp density 129 [yarns]/in, weft density 92 [yarns]/in) was scoured, dyed and dried by normal methods, after which water repellency processing was carried out in the same manner as in Embodiment 1.

Both faces of this water repellency-processed cloth were subjected to sandblast processing by a spray method under the following conditions: spray nozzle diameter of 5mm, compressed air pressure of 3.0kg/cm^2, a spray distance of 20cm, and a spray time of 100 seconds/m^2,using 80-mesh silica particles.

Next, both faces of the cloth were coated with a knife coater with a resin solution [*literal translation*: "resin liquid"] made up of 75 parts "Haidoran[?"Hydran"] HW-111" (polyurethane resin, manufactured by Dai-Nippon Ink] Co.), 20 parts "Haidoran[?"Hydran"] HW-140" (polyurethane resin, manufactured by Dai-Nippon Ink Co.), and 5 parts "Dikku[?"Dick"] Silicone Softener 500" (silicon-type softening agent, manufactured by Dai-Nippon Ink Co.), after which they were dried at 100°C for 10 minutes and heat-treated at 180°C for 30 seconds (Embodiment 2). The thickness of this coating film was 56 microns.

As comparative examples, coating was carried out in the same manner as in Embodiment 2 on the same dyed cloth as in Embodiment 2 and neither water repellency-processing nor sandblast-processing was carried out (Comparative Example 4); and [the cloth] was subjected only to water repellency-processing in the same manner as Embodiment 2 (Comparative Example 5).

The coating film peeling strength and the height of water absorption from the cut face of the coated cloths obtained are shown in Table 2.

As can be seen from Table 2 the item according to the present invention had a high peeling strength and permeation of water from the cut face due to capillary action was extremely small.

Table 2

	water repellency processing	sandblast processing	peeling strength (g/cm)	water absorption height (cm/24hr)
Embodiment 2	yes	yes	980	5
Compar. Ex. 4	no	no	870	27
Compar. Ex. 5	yes	no	460	3

Advantages of the Invention

The present invention, despite the fact that it is a coated water repellency-processed cloth item, is able to offer a coated cloth whose coating film has high peeling strength and in whose coating resin no penetration is seen. In addition, a coated cloth of the present invention can prevent permeation of water from the cut end face due to capillary action.

Patent Applicant: Toray Co. Ltd.

Translator's General Note: The Japanese text generally makes no distinction between singular and plural, and therefore most singulars and plurals in the English translation are based on deduction from context. The same applies to "a" and "the".